



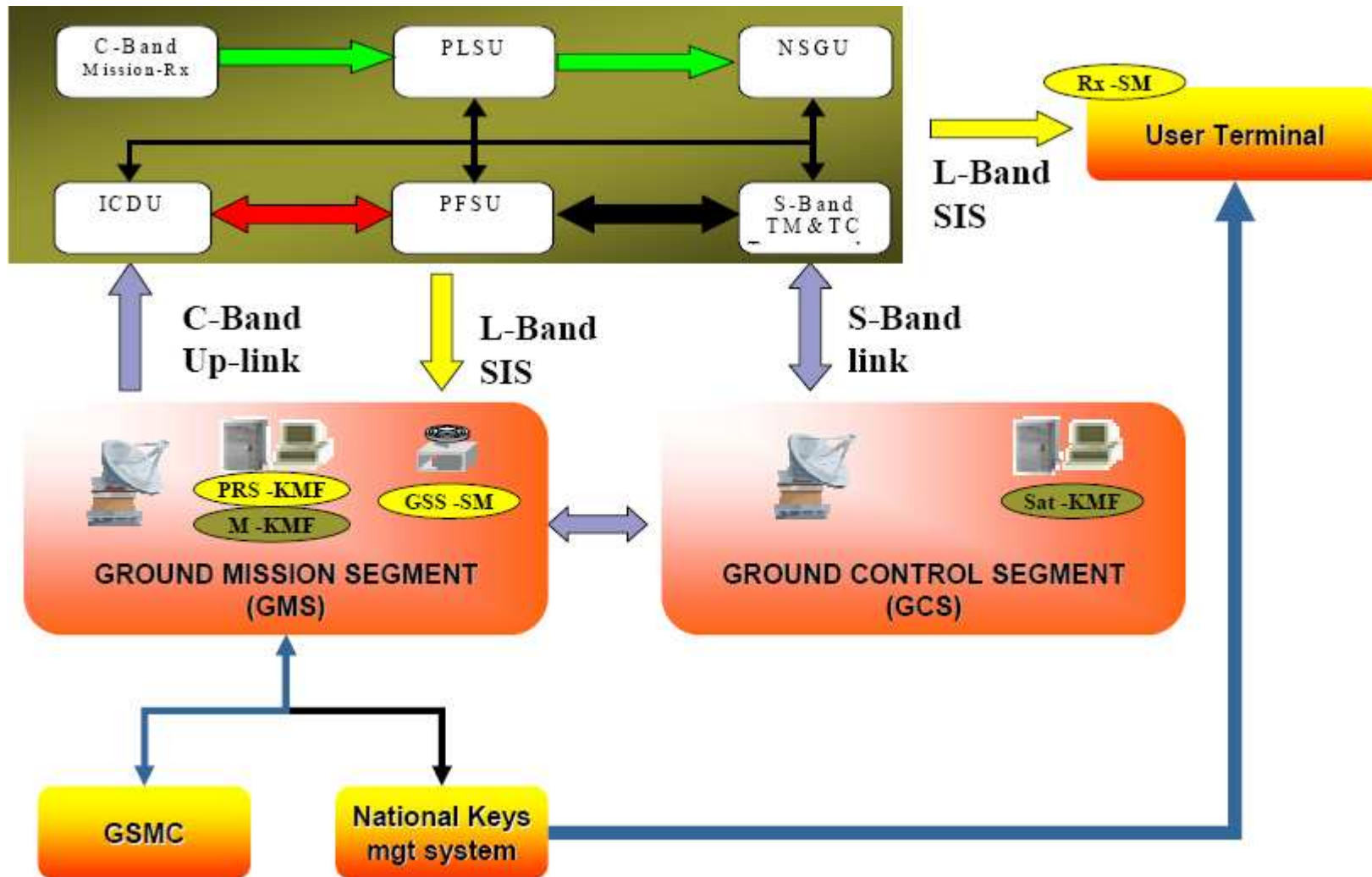
The “dual use” concept of Galileo’s Public Regulated Service (PRS)

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- **The security aspect in Galileo has two main objectives**
 - Protection of the entire system
 - Provision of a secure PRS
- **The implementation of security in Galileo led to the use of “military” technology (e.g. key management and encryption codes for PRS)**
- **The satellite design does not meet military standards (no “military hardening”) whereas the ground infrastructure (control centres, ULS/TT&C/Sensor stations and network) is well protected e.g. against terrorist attacks**
- **Safety and security requirements cover all elements and levels of the Galileo system**
- **Contrary to a military system like GPS or Glonass, Galileo will be certifiable and accreditable**

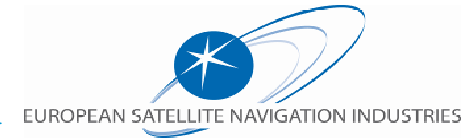
Security architecture



- **Galileo follows an opposite approach compared to the two existing satellite-based radio navigation systems GPS and Glonass:**
 - Both existing systems have been designed around military needs – almost by coincidence the civil market discovered the huge benefits of satellite-based navigation
 - Today, GPS is a global multi-billion \$ market with civil users outnumbering by far military users (~100:1 in USA)
- **Galileo has been designed around the needs of the civil / commercial market with the potential to use it as well by armed forces**
- **Galileo's Public Regulated Service (PRS) is the service of interest for armed forces / military applications:**
 - robust and access-controlled service for government applications (protected against jamming and spoofing)
 - operational at all times and in all circumstances, notably during periods of crisis ("continuity of service")
 - separated from other services that can be denied without affecting PRS operations
 - offers an integrity signal – also planned in the GPS upgrades (M-Code)

- **Galileo is a civil system under civil control**
- **Large satellites systems (Communications, Earth Observation) are generally dual use systems**
- **In principle, the system is conceived in such a way to fit the needs of the military users too**
- **Applications such as crisis management, law enforcement, tracking of dangerous goods are often involving military corps (Italian Carabinieri and Guardia di Finanza, French Gendarmerie, etc)**
- **The same applies to missions for peace-keeping or defence**
- **Dual use of Galileo *de-facto* is a reality**
- **Further implementation of dual use would bring pro's and con's**

Dual Use of Galileo – Pro's and Con's



- **Enlarged Business Case as most military platforms are now equipped with navigation components**
 - Navigation receivers able to send position information on the Tetra channels are already available on the market
- **Improved European sovereignty and independence**
- **Better match of interoperability with GPS as GPS is already dual-use**
- **Increased robustness due to the interoperability of two systems with a very high level of security**
- **More complex system, to cope with military more stringent requirements**
- **Concept for the “Command and Control” to be developed, but more complex than for a civilian system**
 - COSMO Case :
 - Combined defence / civilian use of the system
 - Dedicated defence / civilian user ground segment for image programming, acquisition, production and delivery
 - Granted priority access to defence users in case of conflicts,
 - Security certification for the architectural elements defined as “Target Of Evaluation (TOE)”
- **Increased levels of data classification, more difficult access to data for consumer manufacturers**
- **Potential problems with SoL usage of signal, liability, guarantee and certification due to “military” level security requirements**

- **Galileo is a civil system under civil control well suited and capable of offering one of its services, the PRS, to a military customer**
- **The concept of “dual use” is fading away:**
 - Civil users like police forces or border patrol units in charge of “homeland security” increasingly require the same type of equipment than their military counterparts
 - Civil applications such as crisis management, law enforcement, tracking of dangerous goods are often involving military corps (Italian Carabinieri and Guardia di Finanza, French Gendarmerie, etc)
- **PRS is a perfect example for this new concept, however a clear policy for using PRS is urgently needed**
- **PRS provides “integrity”, a feature not available in today’s GPS**
- **In a stepped approach, the Galileo infrastructure must be further developed and designed in such a way that also operational needs and requirements of armed forces (→ “military hardening”) will be met in the future**
- **Key issues at stake to be considered/solved**
 - Political agreement of National Governments on concept of use
 - Security management concept to be defined
 - PRS accreditation process